United States Department of Agriculture
Forest Service

DRAFT Stormy Project Environmental Assessment

Salmon-Cobalt Ranger District, Salmon-Challis National Forest
Lemhi County, Idaho
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Planning, Appeals, & Litigation (PALS) project tracking number: 58729

Cover Photo: View of the Stormy project area taken from the valley floor. Forest Service photo by Ken Gebhardt. Other Forest Service photos in this document are by Nathan Eby and Lette Benson.

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1. Project Description and Background

1.1. Introduction

1.1.1. Environmental Assessment Documentation

This environmental assessment document (EA) describes the purpose and need for action and three alternatives to meet that purpose and need. It also documents the interdisciplinary team's (IDT) environmental analyses of these alternatives.

1.1.2. Project Description

The Salmon-Challis National Forest (Salmon-Challis) proposes to authorize manual and mechanical treatments and prescribed burning that would reduce stand densities, increase growing space and health for existing trees, and decrease hazardous fuels within the 23,040-acre Stormy project area. Alternative 1 proposes to treat 17,451 acres. Alternative 2 proposes to treat 17,485 acres. Alternative 3 proposes to treat 4,616 acres.

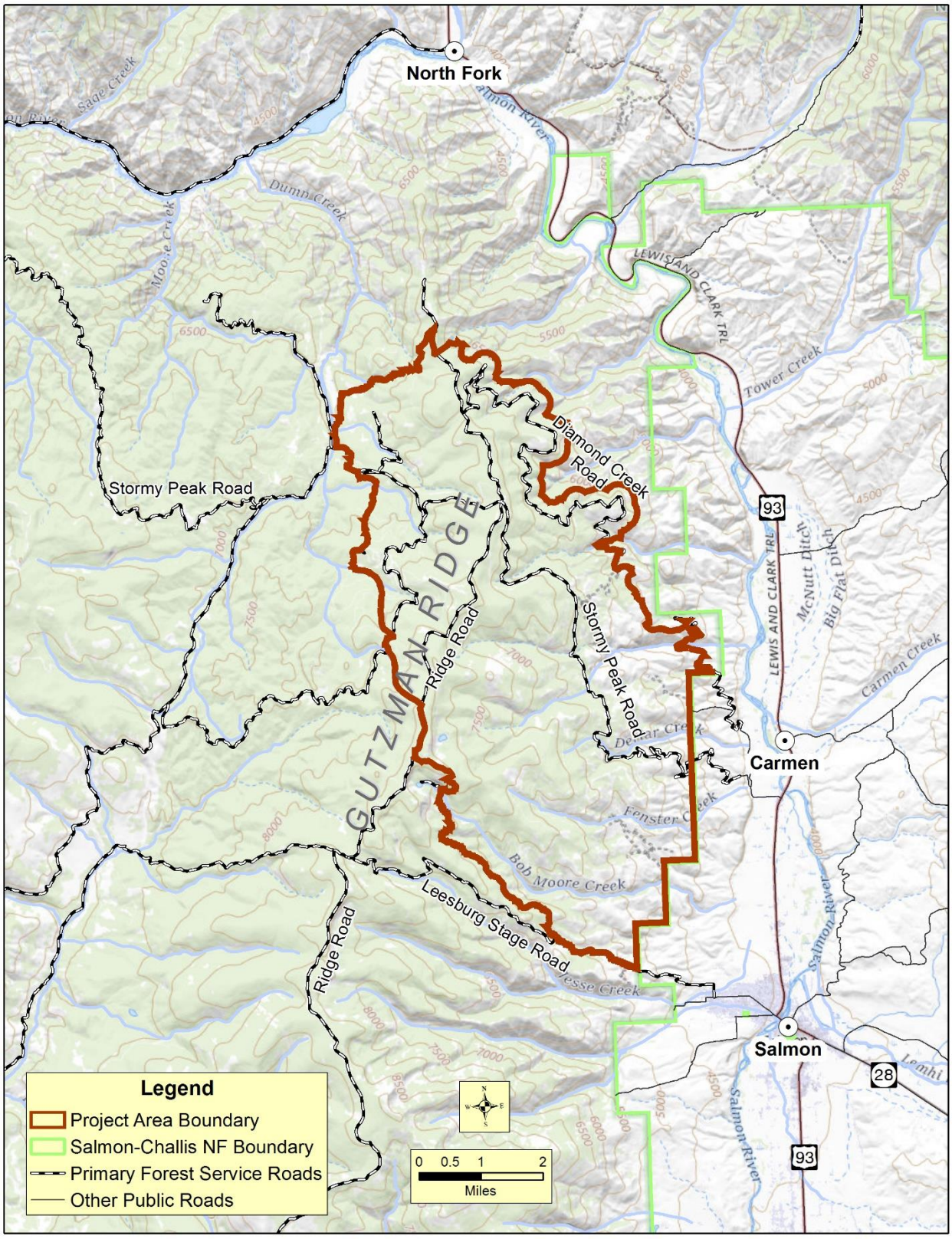
The Salmon-Challis expects to begin implementing this project in 2023.

An interactive map of the Stormy draft alternatives is available at the following web address: https://bit.ly/StormyProjectMap

1.1.2.1. Location

The project area is on the Salmon-Cobalt Ranger District northwest of Salmon, Idaho. (See map 1.) It straddles Gutzman Ridge from Napoleon Hill at the northern end to the Old Leesburg Road at the southern end. Units planned for treatment occur on both the east and west slopes of Gutzman Ridge and along the Ridge Road (#60020). The project area borders Sawmill Gulch Road (#60051) and Diamond Creek Road (#60129) to the north; the Salmon-Challis boundary to the east; UP Lake Road (#65001) and Leesburg Stage Road (#65002) to the south; and Daly Creek Road, Upper Daly Creek Road (#60722), and Racetrack Road (#60053) to the west.

The legal description of the project area is T23N, R21E, Sections 7, 8, 9, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35; T23N, R20E, Sections 13, 24, 36; T22N, R21E, Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 26, 27, 28, 34, 35; and T22N, R20E, Section 1.



Map 1: Project area

1.1.2.2. Forest Plan Management Areas

The project area is on land designated under the *Salmon National Forest Land and Resource Management Plan* (Forest Plan) Management Areas as 5B (Medium Timber) and 8A (Rangeland Management). The project area also includes about 173 acres of private land and 1,535 acres of designated old growth areas (USDA Forest Service 1988). The Salmon-Challis would evaluate designated old growth areas to verify whether they meet old growth criteria (Hamilton 1993). Areas that meet these criteria would not be treated.

1.1.2.3. Project Area Watersheds

The project area includes all or parts of the following watersheds: Dump Creek-Salmon River; Fenster Creek-Salmon River; Moose Creek; Wagonhammer Creek-Salmon River; and Wallace Creek-Salmon River.

1.2. Project Purpose and Need

The purpose of the proposed action is to restore ecosystem diversity across the landscape. Treatments would be designed to accomplish the following:

- Increase resilience to a variety of forest insect and disease agents
- Reduce the large accumulation of dead and dying hazardous fuels, especially those associated with recent epidemics of bark beetles, western spruce budworm, and endemic dwarf mistletoe
- Provide a mix of forest products to local and regional purchasers through personal-use and commercial permits and timber sale contracts
- Treat fuels adjacent to the Jesse Creek drainage to reduce the potential negative impacts of a large wildfire in the Salmon Municipal Watershed
- Create a defensible corridor to improve firefighter and public safety

1.2.1. Documents Incorporated by Reference

The IDT completed a variety of analyses to assess the alternatives' capacity to meet the purpose and need for this project. The documents pertaining to those analyses and other project documents that contributed to project development are in the project record. The documents in the project record are incorporated by reference into this environmental assessment.

1.3. Consultation and Coordination

1.3.1. Tribal Consultation

The Salmon-Challis sent letters on October 26, 2020 to inform the Nez Perce and Shoshone-Bannock Tribes of the proposed project and to request feedback.

1.3.2. Public and Federal, State, and Local Agencies

A legal notice appeared in the October 15, 2020 edition of the Recorder Herald, which is the paper of record for the North Zone of the Salmon-Challis. The legal notice also appeared in the October 14, 2020 editions of the Challis Messenger and Arco Advertiser.

The Salmon-Challis sent out 224 scoping letters that went to individual members of the public; Federal, State, and local agencies; and non-governmental organizations.

1.3.2.1. **Agencies**

Idaho Department of Fish and Game, Idaho Department of Lands, U.S. Army Corp of Engineers, Idaho Department of Parks and Recreation, U.S. Fish and Wildlife Service, Idaho Department of Water Resources, U.S. Environmental Protection Agency, Idaho Department of Agriculture, Bureau of Land Management, Idaho State Office of Species Conservation, and National Marine Fisheries Service.

1.3.2.2. Elected Officials

Blaine, Butte, Custer, and Lemhi County Commissioners; the City of Salmon, Idaho; the City of Challis, Idaho; Idaho State Representatives; U.S. Congress Idaho Representatives, and the U.S. Senators from Idaho

1.3.2.3. **Organizations and Businesses**

Alliance for the Wild Rockies, Native Ecosystem Council, Wildland Defense, Upper Salmon Basin Watershed Program, Western Watershed Project, Idaho Forest Product Commission, Lemhi Custer Grassroot Advisory, American Forest Resource Council, the Wilderness Society, Tri-County Cattleman Association, Rocky Mountain Elk Foundation, Custer County Farm Bureau, Blue Ribbon Coalition, Central Idaho Rangeland Network, Backcountry Hunters and Anglers, Trout Unlimited, Lemhi Forest Restoration Group, Sawtooth Valley Wildfire Collaborative, Central Idaho Land Collaborative

1.3.4. Interdisciplinary Team (IDT)

The following Salmon-Challis resource specialists served on the IDT for this project:

Botany, Pollinators, and Invasive Plants: Diane Schuldt

District Ranger: Ken Gebhardt

Engineering: Pete Schuldt

Fisheries: Dan Garcia

Fire: Melissa Sartor

Fuels: Wade McPhetridge

GIS Analysis: Andy Klimek

Heritage: Cammie Sayer

Hydrology: David Deschaine

IDT Leader and Forestry: Nate Meyer

NEPA: April Barron

NEPA: Sandy Kollenberg

Range: Kyle Nelson

Recreation and Scenic Resources: Larry Vogel

Silviculture: Nathan Eby

Soils: Jeremy Back

Tribal Consultation: Tim Canaday

Wildlife: Michael Steck

2. Key Issues

2.1. Key Issues

In the context of an environmental assessment (EA), "issues are statements of cause and effect, linking environmental effects to actions" (Forest Service Handbook (FSH) 1909.15, Chapter 10, section 12.41). The Forest Service uses issues to focus on the potential effects of a proposed action and its alternatives, "giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decision maker and public to understand" (FSH 1909.15, Chapter 10, section 12).

During project development, the decision maker identified two key issues to consider during the environmental analysis. These two key issues are as follows:

- **Key issue 1:** Which alternative would use treatments that would work in the right place?

  Indicator: Number of acres treated by risk of stand-replacing wildfire

- **Key Issue 2:** Which alternative would most reduce risk of potential undesired impacts from broadcast burning?

  Indicator: Number of acres treated by broadcast burning

The results of the analysis for these two key issues are described in section 4, Environmental Consequences below.

3. Alternatives

The Salmon-Challis considered three alternatives to meet the purpose and need for this project.

3.1. Treatment Types

Each of the three alternatives uses some combination of commercial harvest, timber stand improvement thinning, and prescribed burning. In all alternatives, some treatments are designed to overlap with one another. For example, an area may be proposed for commercial timber harvest, followed by broadcast burning. In Figure 1, 80 acres of a harvest unit overlap a broadcast burn unit. In this example, the total area which would be treated when the overlap is removed is 220 acres.

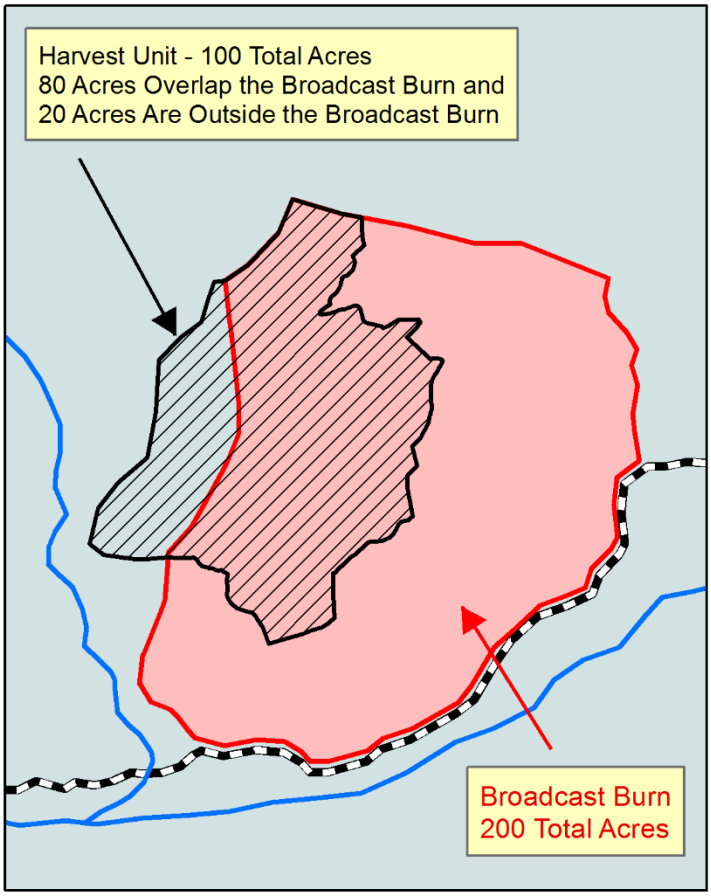


Figure 1: Example of Overlapping Treatments

Sections 3.1.1, 3.1.2, and 3.1.3 below describe the treatments and their objectives; section 3.2 describes project coordination planning; and section 3.3 describes project design features. The individual alternatives are described in sections 3.4 and 3.5.

Manual and mechanical[1] treatments and prescribed fire are designed to reduce stand densities. Lowered stand densities promote the health of residual trees, increase growing space, and decrease hazardous fuels.

These treatments may be accomplished through contracts, agreements, or other permitted processes, and could be implemented by Federal and State agencies, contractors, cooperators, and other interested partners. Proposed treatments include the following:

- Harvest of Douglas-fir stands to decrease the occurrence of dwarf mistletoe and create stand conditions resilient to Douglas-fir bark beetle
- Harvest of lodgepole pine, subalpine fir, and Engelmann spruce-dominated stands to promote resilience to a variety of insect and disease agents
- Harvest and thinning within aspen and whitebark pine stands to promote stand size and health of these species when practicable
- Thinning of understory trees to promote stand health and achieve stand structure objectives
- Prescribed fire, including pile, jackpot, and tree well burning, in all treatment units to remove the accumulation of hazardous fuels and slash buildup generated by treatment activities
- Broadcast burning to reduce fuel accumulations and decrease the risk of stand-replacing wildfire

3.1.1. Commercial Harvest

The objective of commercial harvest is to remove trees that have a commercial value when this activity helps to meet silvicultural and fuels management needs of the stand. Commercial harvest activities may include both ground-based and skyline harvest systems, with ground-based harvest occurring in treatment units that have an average slope of 35 percent or less. Work crews would use harvest methods designed to protect residual trees from damage. Treatments would allow for whole tree yarding to designated landings where work crews would process trees and pile and burn residual slash.

Commercial harvest would be used as silvicultural treatments to meet timber stand objectives. Treatments include commercial thinning, individual tree selection harvest, shelterwood harvest, seed tree harvest, intermediate cut harvest, and clearcut harvest per direction in the *Salmon National Forest Land and Resource Management Plan* (Forest Plan) (USDA Forest

[1] For example, chainsaws, axes, handsaws, rakes, and ground-based and skyline commercial harvest systems.

Service 1988) for management area 5B[2] and in keeping with common silvicultural practices. Seed tree, shelterwood, and clearcut harvest units would not exceed 40 acres, per 36 CFR §219.11. Individual timber stand conditions, including stocking levels, species distribution, and occurrence of insect and disease agents, guide the choice of silvicultural treatment.

Commercial harvest would be accomplished through multiple timber sale contracts designed for both larger regional mills and smaller local operators. The project includes consideration of personal use permit firewood and post and pole collection, where appropriate and accessible.

Access to harvest units may occur on any existing or authorized routes. This would include existing forest system roads and unauthorized roads. Unauthorized roads used to access Stormy project treatment units would be considered temporary roads while in use. To comply with Forest Plan Standards and Guidelines, temporary roads would be treated to address any resource concerns both prior to and after use. This includes, but is not limited to, soil compaction, drainage, and erosion. When project activities are completed, temporary roads would be treated as described in the Project Design Features section below (section 3.3). All new temporary roads would be decommissioned following use. This project would not authorize permanent road reconstruction or construction.

3.1.2. Timber Stand Improvement Thinning

Timber stand improvement thinning (referred to as "thinning" in this document) would primarily be implemented to decrease dwarf mistletoe in understory Douglas-fir and lodgepole pine; reduce the competition for sunlight, water, and nutrients; and decrease ladder fuels. When whitebark pine is encountered, thinning would be designed to promote whitebark pine resiliency and promote regeneration.

Work crews would implement thinning in areas that do not have trees of commercial value. Additionally, this treatment would occur within commercial harvest units after harvest activities are completed.

Slash from thinning activities could either be lopped and scattered or piled, depending on stand structure and hazardous fuels levels in the unit. Tools to complete these activities may include:

- Chainsaws or other mechanical hand tools
- Mechanized equipment mounted with the following:
    - Mastication heads to thin vegetation on slopes ranging from 0-20%

[2] The Forest Plan divides the Salmon National Forest into various management areas, each with its own management direction. In Management Area 5B, the management "emphasis direction is on producing long-term timber outputs through a moderate level of investment in regeneration and thinning" (USDA Forest Service 1988).

- Grapples to drag wood
- Felling and processing heads to thin vegetation on slopes ranging from 0-20%

3.1.3. Prescribed Fire

The objective of prescribed fire is to decrease hazardous fuels through pile burning, jackpot burning, tree well burning, and broadcast burning. These terms are explained below.

Prescribed fire in combination with commercial harvest and thinning can decrease the risk of high-severity stand-replacing wildfire. Photos 1 and 2 show examples of prescribed fire operations in progress.

Pile burning activities would occur within areas previously treated by commercial harvest or thinning. Jackpot, tree well, and broadcast burning would occur in areas where harvest or thinning treatments are not practicable. Tools to complete these activities could include:

- Hand ignition devices such as drip, terra, and propane torches
- Aerial ignition devices such as Unmanned Aircraft Systems (drones), helicopter torches, or plastic sphere dispensers (PSD)

3.1.3.1. Proposed Prescribed Fire Methods

Pile Burning

Slash piles created through harvest and thinning activities would be burned. Piles would be spaced away from residual trees to reduce the risk of mortality during burning operations. Pile spacing would depend on slope and residual tree densities. Fire would be allowed to creep from the piles but would be restricted from crossing the harvest or thinning unit boundary.

Photo 1: Pile burning in a Douglas-fir stand

Jackpot Burning

Jackpot burning would target natural or modified accumulations of fuels where harvest or thinning is not practicable and where there are high concentrations of fuels to be reduced before broadcast burning occurs.

Jackpot burning would reduce fuel loading in a patchy mosaic pattern. Fire would be allowed to creep from heavy fuel concentrations but would be restricted from crossing the harvest, thinning or broadcast burn unit boundary.

Tree Well Burning

Tree well burning involves burning the accumulation of needle cast buildup directly under and adjacent to ponderosa pine canopies. This is usually done when there is snow present around large diameter trees with dry surface fuels present. Fire would be allowed to creep from tree wells but would be restricted from crossing the harvest, thinning or broadcast burn unit boundary.

Photo 2: Low intensity prescribed fire operations in Douglas-fir and ponderosa pine stands

Broadcast Burning

Broadcast burning applies prescribed fire to most or all of an area within well-defined boundaries for fuels reduction or as a resource management treatment. Broadcast burning would create a fine-scale, topographically-driven mosaic of vegetation distribution and structural stages.

In general, broadcast burning would occur after harvest and thinning activities have been completed or in units where harvest and thinning cannot be implemented due to access or terrain. To meet resource objectives, broadcast burning would occur only under appropriate spring, fall, and winter conditions.

To meet these objectives, smaller broadcast burn units would be identified within the larger burn blocks. (See maps 2 through 4.) These smaller broadcast burn units and specific prescribed fire plans would be developed based on factors such as the following:

- Firefighter safety
- Prescribed fire objectives
- Vegetation types and silviculture prescriptions
- Surface and ladder fuel types and accumulation
- Weather conditions and fuel moisture
- Fire behavior
- Natural and constructed control features
- Labor and equipment needs

- Ignition, holding, and contingency plans
- Smoke management
- Monitoring
- Unique and special considerations within the burn unit
- Specific broadcast burn unit boundaries would be delineated using control features such as the following:
    - Existing roads
    - Trails
    - Ridgelines
    - Open meadows
    - Scree slopes
    - Constructed fire line

The intent of broadcast burning is to reduce fuel loading in a patchy mosaic pattern across much of the burn area. This means that not all of the areas within the larger burn blocks would be treated. These treatments would ultimately result in reducing hazardous fuels and the risk of a stand-replacing wildfire. Broadcast burn unit boundaries may be adjusted to ensure they are practicable and provide for firefighter safety prior to implementation.

The Salmon-Challis expects that maintenance burning would occur every 5-10 years or as needed to maintain desired fuel loading and to meet any silvicultural prescription needs.

3.2. Project Coordination

All project activities would be consistent with the Forest Plan and amendments and any relevant laws and regulations current at the time of implementation. Examples include the following:

- Smoke management approvals
- State law
- National Core Best Management Practices
- Pacific Anadromous Fish Strategy (PACFISH)
- Forest Service Manual 2500: Water Resources Management
- Forest Service Handbook: Regions 1 and 4 Soil and Water Conservation Handbook
- Region 4 Watershed and Air Management Manual
- The Clean Water Act
- Idaho Environmental Protection and Health Act
- Idaho Stream Channel Protection Act

Coordination with the appropriate Forest Service personnel would occur before and during project implementation to ensure all project work would be compliant with the standards, guidelines, and other practices that are current at the time of implementation. At a minimum, annual coordination discussions should cover the following:

- Project schedule and design, for example, timing treatments to minimize Ips beetle buildup
- Review of silviculture prescriptions, contracts, burn plans, etc.
- Treatments in riparian areas
- Meeting Forest Plan standards for Total Soil Resource Commitment (TSRC)
- Applicable Forest Plan standards and guidelines, and other applicable laws, regulations, and Best Management Practices
- Applicable Forest Plan standards and guidelines for treatment of snags, log debris, and aspen
- Measures for preventing the spread of invasive plants
- Newly acquired information regarding Threatened or Endangered species, Region 4 Sensitive Species, or pollinators
- Suitable site-specific measures to limit impacts to sensitive plants
- Options for seeding, seed mix selections, and erosion control products
- Protective measures for cultural sites and special management areas
- Resource treatment options for temporary roads, stored roads, unauthorized routes, and trails after implementation
- Location of operational sites, such as camps, helicopter landing sites, staging areas, safety zones, and fueling and servicing sites
- Selection of water drafting sites
- Identification of appropriate materials to use for erosion and sediment control

3.3. Project Design Features

3.3.1. Air Quality

1. Coordinate prescribed burns with the Idaho-Montana Airshed Group and ensure all prescribed burns meet the Idaho-Montana Airshed Group operational plan.
2. Follow the burn plan notification process for all prescribed fire activities.

3.3.2. Fire and Fuels

3. When practicable, locate all piles at least 30 feet from any cone-producing whitebark pine.
4. Exclude plantations from broadcast burning if objectives cannot be achieved with a low intensity or low-severity fire.

3.3.3. Fisheries

5. When drafting, do not remove more than 25% of the stream flow to reduce the possibility of stranding fish. These drafting sites would be in streams so as not to disturb spawning fish and their redds.
6. Use only pump intake screens with openings that do not exceed 3/32 inches in diameter and that have a surface area proportionate to the pump intake capacity. Maintain a velocity of no more than 0.2 feet per second at the surface of the intake screen to avoid trapping small fish.
7. Adhere to water drafting equipment screening requirements defined by National Marine Fisheries Service.

3.3.4. Heritage Resources

8. Stop work and notify appropriate Forest Service personnel within 24 hours if previously unknown heritage resources are discovered during project implementation.

3.3.5. Invasive Species

9. Retain native vegetation in the project area where practicable, consistent with project objectives, to prevent weed establishment, growth, and spread, and to maintain suitable habitat for sensitive plants.

3.3.6. Range

10. Contain all individual prescribed fire units within individual grazing allotment units where practicable, to allow for coordination of grazing rotations with grazing permittees prior to implementation.
11. Avoid damaging range improvements. If project activities cause damage to any range improvements, repair the damage.

3.3.7. Recreation

12. Restore or rehabilitate any trails affected by project activities to their original condition and profile.
13. Place signs in key locations to inform recreationists of project objectives. When practicable, do not use developed recreation sites, including campgrounds and trailheads for landings or staging areas, and coordinate any other use with the appropriate Forest Service personnel.

3.3.8. Sensitive Plants

14. Avoid sensitive plant occurrences when constructing fire line, temporary roads, and other ground-disturbing activities when practicable.

3.3.9. Soils and Water

3.3.9.1. Rehabilitation Activities

15. Rehabilitate fire lines and skid trails by ensuring proper drainage and pulling in debris and topsoil as available.
16. Rehabilitate harvest landings when practicable. Practices may include topsoil redistribution, contouring, and decompaction.
17. When practicable, retain 15 tons of down woody material per acre and no less than five tons per acre.

3.3.9.2. Use of Fuel, Oil, and Hazardous Liquids

18. In order to prevent petroleum products from entering the stream channel, place pumps and their fuel containers on an impermeable liner capable of containing 1.5 times the total volume of fuel, oil, or other hazardous liquids.
19. Refuel equipment (excluding pumps) outside of riparian habitat conservation areas (RHCA).

3.3.9.3. Location of Operational Sites

20. Locate camp sites, helicopter landing sites, staging areas, and refueling sites outside of RHCAs, wetlands, and sensitive soil areas.

3.3.10. Roads and Transportation

21. Conduct project activities when site conditions are conducive to minimizing impacts on soil and water resources. Do not conduct activities when roads and activity areas are very wet to prevent excessive rutting (greater than four inches) and soil compaction.
22. Maintain standard clearing widths and sight distances on open roads and remove any trees on or above the cut slope that have been destabilized. Minimize general clearing widths on temporary roads to the limits of the cut and fill to help screen the road while removing unstable or hazardous trees.
23. Apply dust abatement measures as needed during haul periods following standard operating procedures and any measures identified in the appropriate biological assessments.
24. Adhere to the following road maintenance practices (at a minimum) to minimize the erosion and damage inherent in winter logging:
    a) Ensure that roads to be used for winter operations have adequate surface and cross drainage installed prior to winter operations.

b) Drain winter roads by installing rolling dips, drivable cross ditches, open top culverts, outsloping, or by other suitable means.

c) During winter operations, maintain roads as needed to keep the road surface drained during thaws or break up. This may include active maintenance of existing drainage structures, opening of drainage holes in snow berms and installation of additional cross drainage on road surfaces by ripping, placement of native material, or other suitable means.

25. Monitor visual indicators, including wheel depressions and rutting, to assess the need for road maintenance.

26. Fully decommission newly constructed temporary roads following vegetation treatments. The Salmon-Challis may authorize firewood gathering following harvest in select locations if trees are available and if use of the temporary road would not cause soil or water resource damage. In these situations, decommissioning would occur after the authorized period for firewood gathering ends. Decommissioning treatments could include one or more of the following: blocking access, recontouring, decompaction and ripping, re-vegetation, culvert removal, seeding, mulching, and re-establishment of natural drainage.

27. Place stored roads used to access treatment units back into storage following vegetation treatments and any subsequent allowance for temporary firewood gathering. Storage treatments would vary along each road and may include one or more of the following: blocking access, scarification, water bar installation, revegetation, seeding, mulching, and culvert removal (replaced with a rolling ford) if the structure may fail over an extended period. The intent of the storage treatments would be to stabilize the road to prevent soil and water resource damage while considering needs for future administrative and emergency access.

3.3.11. Wildlife

28. Inform the appropriate Forest Service personnel of the discovery of any previously unknown nest or den of a Threatened, Endangered, or Sensitive species in the project area. The Salmon-Challis would determine appropriate measures at that time.

29. Avoid broadcast prescribed fire in distinctly identifiable stands of mountain mahogany. Avoid ignition within or below distinctly identifiable mahogany stands or piling fuels within and near mahogany stands. If practicable, protect mahogany patches from burning if they are small inclusions in a larger vegetation type.

3.4. Alternative Considered but Eliminated from Detailed Study

A fourth alternative was considered but not analyzed in detail. This alternative included additional commercial harvest in remote, unroaded portions of the project area and did not include broadcast burning. Other methods of prescribed fire (pile, tree well, and jackpot

burning) were considered. This alternative would have required construction of new system roads.

Because the Stormy project has never included system road construction nor scoped to the public on travel management under 36 CFR 212 Subpart A, this alternative is outside the scope of this analysis.

This alternative was also not analyzed in detail because the additional timber harvest would not be economic. The road construction, harvest operation, and other costs would not be offset by the value of the additional timber volume. Due to the steepness of the slopes, most of the additional timber volume would need to be harvested through skyline logging systems. Costs for skyline logging are notably higher than other logging systems.

The concept of excluding broadcast burning from this proposed alternative and including other forms of prescribed fire is included in the range of alternatives analyzed in detail.

3.5. Alternatives Analyzed in Detail

3.5.1. Alternative 1

Alternative 1 includes commercial harvest, thinning, and prescribed fire. Map 2 shows the location of treatment units for this alternative. (An interactive map of the Stormy draft alternatives is available at the following web address: https://bit.ly/StormyProjectMap) As described in section 3.1, some treatments in Alternative 1 overlap with one another. When all overlap between the treatments is removed, a total of 17,451 acres are proposed for treatment under Alternative 1. See table 1 for a comparison of the alternatives.

3.5.1.1. Commercial Harvest

Under Alternative 1, commercial harvest would include the following:

- 3,454 acres of commercial harvest
- 3.24 miles of temporary road construction

3.5.1.2. Timber Stand Improvement Thinning

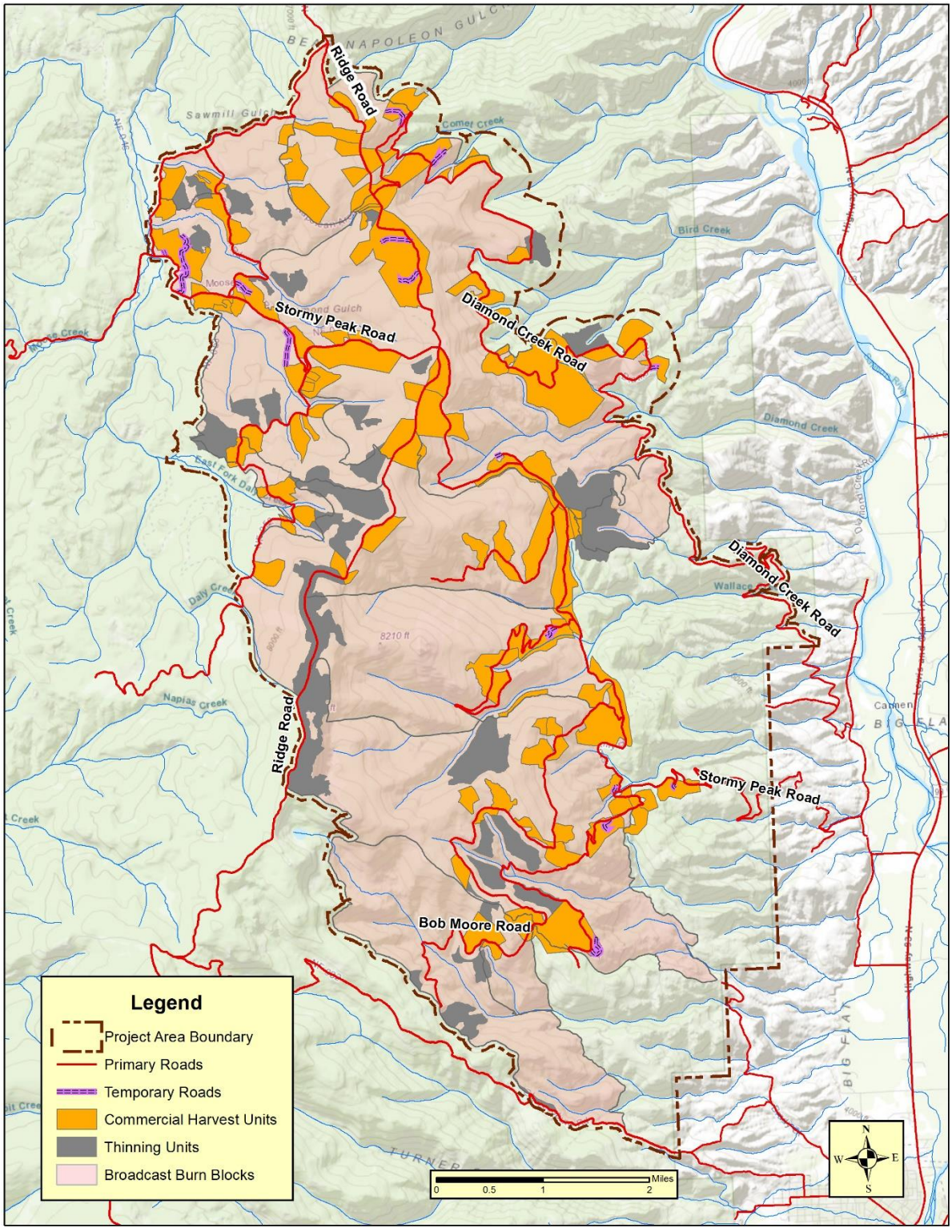
Under Alternative 1, thinning would include the following:

- 1,596 acres of thinning
- Additional thinning could occur within commercial harvest units

3.5.1.3. Prescribed Fire

Under Alternative 1, prescribed fire would include the following:

- Pile burning within the commercial harvest and thinning units
- Jackpot burning where conditions warrant within harvest, thinning, and broadcast burn units
- Tree well burning where ponderosa pine is found within harvest, thinning, and broadcast burn units
- 4,627 acres of broadcast burning within harvest and thinning units
- 12,401 acres of broadcast burning outside of harvest and thinning units



Map 2: Alternative 1

3.5.2. Alternative 2

As in Alternative 1, Alternative 2 includes commercial harvest, thinning, and prescribed fire. However, Alternative 2 includes more acres of commercial harvest. Map 3 shows the location of treatment units for this alternative. As described in section 3.1, some treatments in Alternative 2 overlap with one another. When all overlap between the treatments is removed, a total of 17,485 acres are proposed for treatment under Alternative 2. See table 1 for a comparison of the alternatives.

3.5.2.1. Commercial Harvest

Under Alternative 2, commercial harvest would include the following:

- 4,616 acres of commercial harvest
- 3.54 miles of temporary road construction

Alternative 2 includes 715 acres of harvest located along main arterial roads (Stormy Peak Road (#60023), Diamond Creek Road (#60129), Ridge Road (#60020), and Bob Moore Road (#60128)) (see map 3.) These commercial harvest activities would create a consistent defensible corridor for firefighter and public safety. They would connect with other treatment units and increase canopy spacing and decrease the risk of crown fire occurrence.

Harvest units along roads would extend up to 300 feet from the edge of the cut and fill slopes of existing roads.

Roadside areas under Alternative 2 that do not contain trees of commercial value could be thinned.

3.5.2.2. Timber Stand Improvement Thinning

Under Alternative 2, thinning treatments would be the same as under Alternative 1. Thinning would include the following:

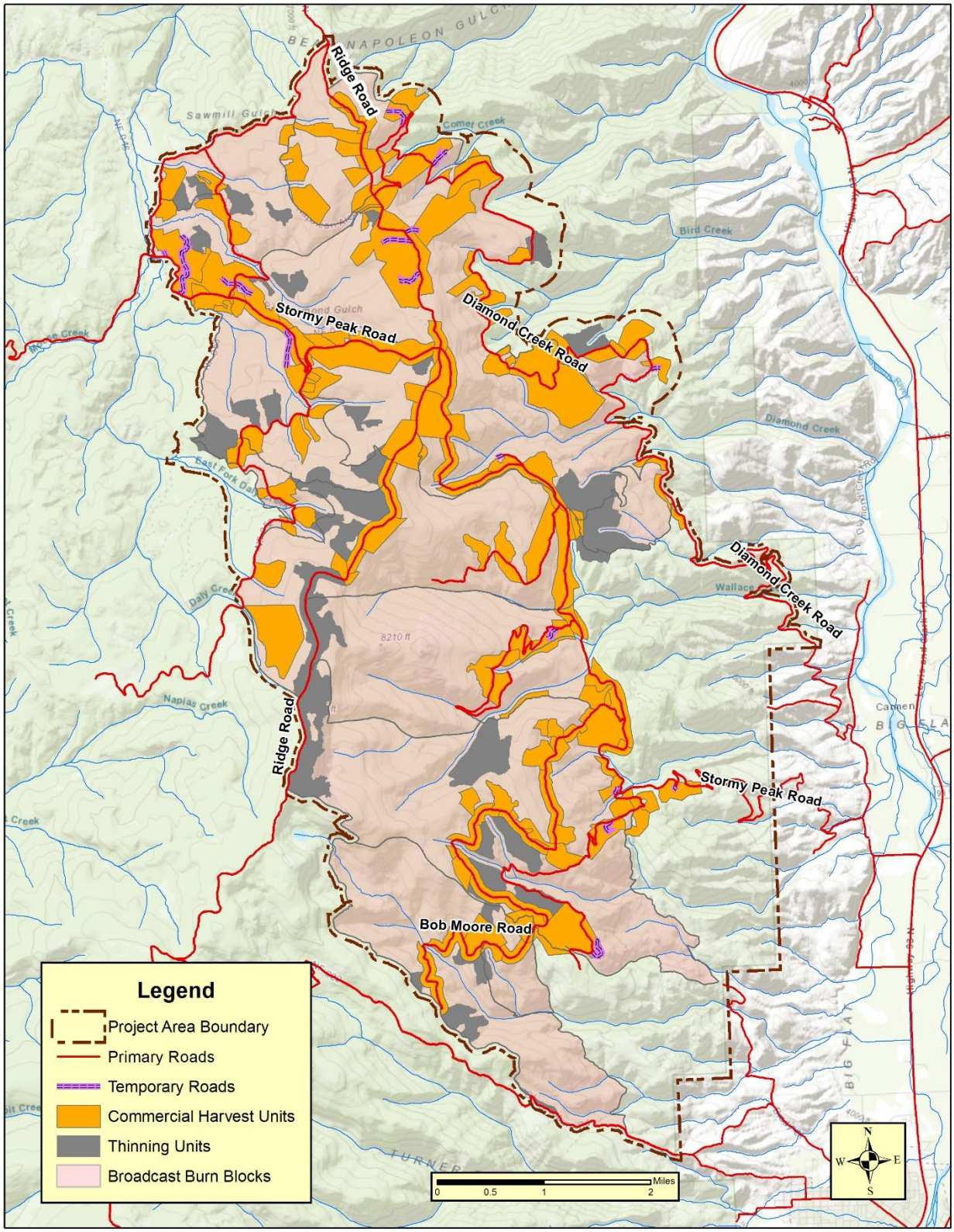
- 1,596 acres of thinning
- Additional thinning could occur within commercial harvest units

3.5.2.3. Prescribed Fire

Under Alternative 2, prescribed fire would include the following:

- Pile burning within the commercial harvest and thinning units
- Jackpot burning where conditions warrant within harvest, thinning, and broadcast burn units
- Tree well burning where ponderosa pine is found within harvest, thinning, and broadcast burn units

- 5,755 acres of broadcast burning within harvest and thinning units
- 11,273 acres of broadcast burning outside of harvest and thinning units



Map 3: Alternative 2

3.5.3. Alternative 3

Alternative 3 consists of commercial harvest treatments and does not include broadcast burning. Thinning, pile burning, jackpot burning, and tree well burning would occur only within the commercial harvest units. As described in section 3.1, some treatments in Alternative 3 overlap with one another. When all overlap between the treatments is removed, a total of 4,616 acres are proposed for treatment under Alternative 3. Fewer total acres would be treated in this alternative than in Alternatives 1 and 2. Map 4 shows the location of treatment units for this alternative. See table 1 for a comparison of the alternatives.

3.5.3.1. Commercial Harvest

Under Alternative 3, commercial harvest would include the following:

- 4,616 acres of commercial harvest
- 3.54 miles of temporary road construction

Alternative 3 includes the same number of acres of commercial harvest as Alternative 2 and more acres of commercial harvest than Alternative 1. As in Alternative 2, 715 acres of harvest are located along main arterial roads to create a consistent defensible corridor. See section 3.5.2.1 for more information.

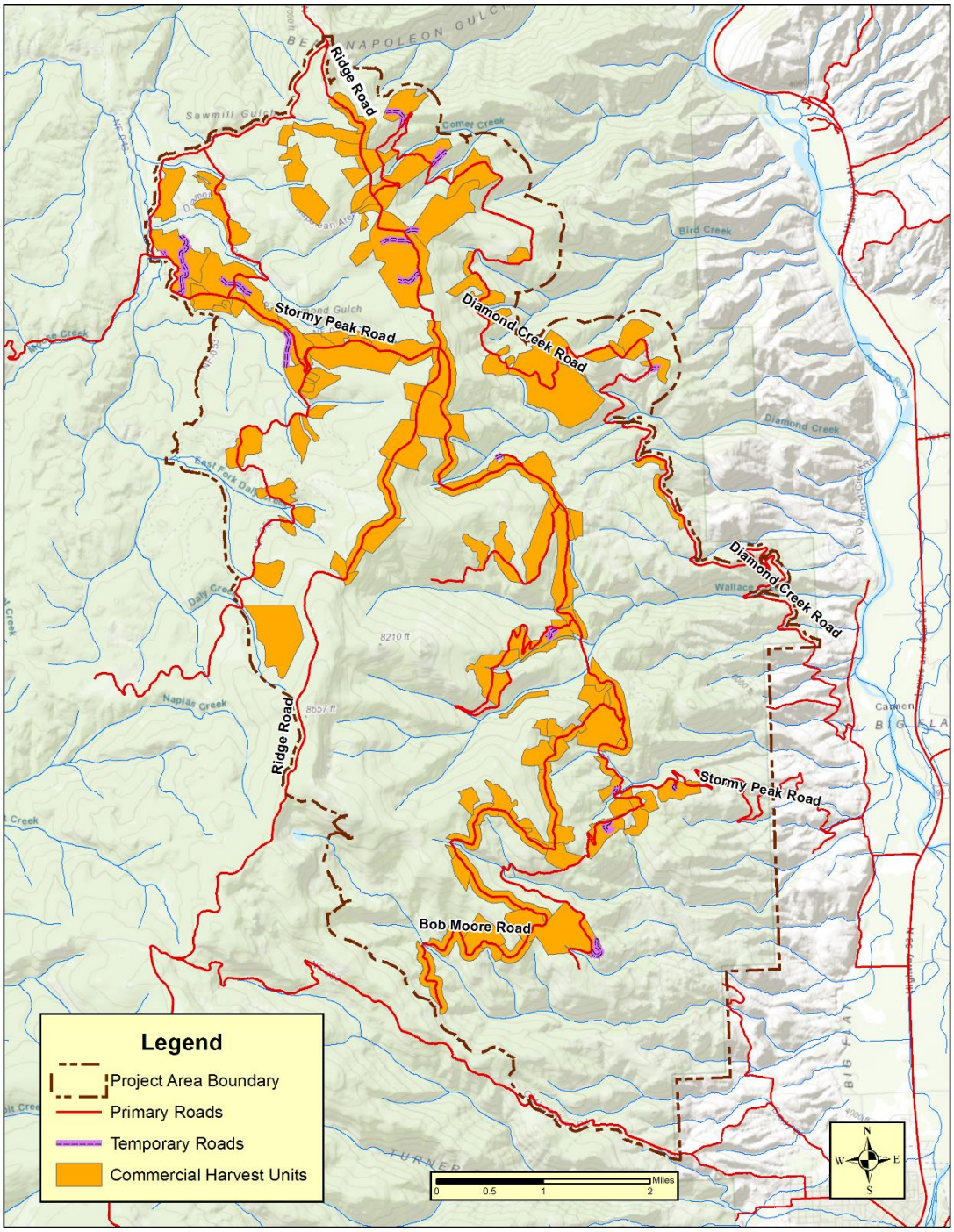
3.5.3.2. Timber Stand Improvement Thinning

Under Alternative 3, thinning would occur only within commercial harvest units.

3.5.3.3. Prescribed Fire

Under Alternative 3, broadcast burning would not be considered. The following prescribed fire treatments are included in Alternative 3:

- Pile burning would occur within commercial harvest units
- Jackpot burning would occur within commercial harvest units where conditions warrant
- Tree well burning would occur where ponderosa pine is found within commercial harvest units



Map 4: Alternative 3

3.5.4. Comparison of Alternatives

Table 1: Comparison of Alternatives 1-3

Treatment	Alternative 1	Alternative 2	Alternative 3
Commercial Harvest	3,454 acres	4,616 acres	4,616 acres
Thinning	1,596 acres and within harvest units	1,596 acres and within harvest units	Only within harvest units
Pile Burning	5,050 acres	6,212 acres	4,616 acres
Jackpot Burning	Where warranted in harvest, thinning, and broadcast burn units	Where warranted in harvest, thinning, and broadcast burn units	Where warranted in harvest units
Tree Well Burning	Where ponderosa pine is found in harvest, thinning, and broadcast burn units	Where ponderosa pine is found in harvest, thinning, and broadcast burn units	Where ponderosa pine is found in harvest units
Broadcast Burning Inside Harvest and Thinning Units	4,627 acres	5,755 acres	Not Considered
Broadcast Burning Outside Harvest and Thinning Units	12,401 acres	11,273 acres	Not Considered
Acres of Overlapping Treatments[3]	(9,677 acres)	(11,967 acres)	(4,616 acres)
Total Acres Treated[4]	17,451 acres	17,485 acres	4,616 acres
Temporary Road Construction	3.24 miles	3.54 miles	3.54 miles

[3] Subtract the value in this row from the sum of the rows above to determine Total Acres Treated.

[4] See Section 3.1 for information about how Total Acres Treated is calculated.

4. Environmental Consequences

This section summarizes the physical, biological, social, and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for the comparison of alternatives. Additional documentation, including more detailed analyses of the project area resources, may be found in the project planning record.

4.1. Affected Area and Existing Conditions

The project area extends for 10 miles along the east- and west-facing slopes of Gutzman Ridge, a major north-to-south-aligned ridgeline. Several intermittent and perennial streams with riparian habitat flow within the project area.

The project area rises from open sagebrush and mountain mahogany habitat along the eastern edge from approximately 4,000 feet elevation into forested habitat that extends up to 7,500 feet on the forested western ridgeline. The forested habitat is made up of Douglas-fir, lodgepole pine, aspen, Engelmann spruce, subalpine fir, and whitebark pine stands. Forested stands range from young to overmature. Lodgepole pine dominates the upper elevation western slope portion towards Moose Creek.

Historically, fires burned across the landscape with differing severities creating a mosaic pattern based on natural fuel buildup and topography. This process created and maintained natural landscape level fuel breaks[5] that inhibited the development of the large scale high-severity[6] stand-replacing wildfires that are more common today. It also contributed to the development of fire-resilient vegetation species, wildlife, and adaptive ecosystems.

Most of the project area has not burned in the past 90 years and is comprised of vegetation that historically burned in 0- to 35-year intervals. Because of the lack of fire in this area, there is uncharacteristically dense vegetation and a high concentration of surface fuels that has accumulated over the last 90 years. The current condition is also exacerbated by prolonged drought and epidemic levels of insects and disease outbreaks. In combination, these factors have contributed to an increase in dead standing trees and downed hazardous fuels across the project area. Photos 3 and 4 show examples of conditions in the project area.

[5] Fire managers design fuel breaks (and any other type of hazardous fuels treatment) to reduce the quantity, density, and configuration of potential fuels that the fire could encounter, which in turn alters fire behavior and reduces impacts to life and property.

[6] For the purposes of this report, “high severity” means high vegetation mortality and stand-replacing.

Photo 3: Existing lodgepole pine stand within the Stormy project area

Photo 4: Mixed conifer stand in the Stormy project area

The Stormy Project, when implemented, would help meet overall stand health and the vegetative condition objectives of the Forest Plan.

Under the current conditions, there is potential for future stand-replacing wildfires and ongoing insect and disease outbreaks within the project area. A mountain pine beetle epidemic occurred in the area about a decade ago and this, combined with the existing dwarf mistletoe infestations in the Douglas-fir and lodgepole pine forest types have created conditions that increases the probability of wildfire burning into the tree crowns or canopy and becoming a high intensity stand-replacing wildfire. Photos 5 and 6 show examples of the effects of insect and disease mortality in the project area.

Photo 5: Douglas-fir stand in the Stormy project area with insect and disease mortality and mistletoe

Photo 6: Douglas-fir stand in the Stormy project area with mistletoe infestation

4.2. Methodology

This EA refers to the following methodologies in the analysis:

1. Forest Vegetation Simulator (FVS, a forest growth and yield model developed by USDA Forest Service) was used to predict future outcomes and the effects of the project's alternatives. FVS is calibrated for specific geographic areas and uses a suite of simulation models to forecast forest composition and structure.
2. Next Generation Fire Severity Mapping is a mapping product depicting the probability of high severity, stand-replacing wildfire, if a wildfire were to occur. This product models the probability of stand-replacing wildfire as a function of fuel, topography, climate, and fire weather (Parks, et al. 2018).

4.3. Effects to Resources

The Salmon-Challis analyzed for effects of the three alternatives on natural resources in the project area. Table 2 summarizes the findings. Abbreviations are defined as follows:

- NE—No Effect
- NI—No Impact

- MIIH—May Impact Individuals or Habitat, but Will Not Likely Contribute to A Trend Towards Federal Listing or Loss of Viability to The Population or Species
- TE—Threatened and Endangered Species

Table 2: Comparison of effects—Alternatives 1-3

Resource, Law, Regulation, or Policy	Alternative 1	Alternative 2	Alternative 3
TE Terrestrial Species	No effect	No effect	No effect
TE Plant Species	NI	NI	NI
TE Fish Species	No effect	No effect	No effect
Sensitive Terrestrial Species	MIIH	MIIH	MIIH
Sensitive Plant Species	MIIH	MIIH	MIIH
Sensitive Fish Species	MIIH	MIIH	MIIH
Clean Air Act (CAA) Consistency	Consistent	Consistent	Consistent
Clean Water Act (CWA) Consistency	Consistent	Consistent	Consistent
Relevant Executive Orders	Consistent	Consistent	Consistent
Salmon National Forest Land and Resource Management Plan (Forest Plan)	Consistent	Consistent	Consistent

4.4. Key Issue 1-- Which alternative would use treatments that would work in the right place?

4.4.1. Goals for Proposed Treatments

There is a need to reduce ladder fuels, standing dead fuels (from recent insect and disease attacks), and undesired tree densities, and to treat unhealthy tree populations within the existing tree stands. The dense canopy and high tree densities have resulted in higher tree mortality from insects and disease and from stress and competition and have increased the probability of a large wildfire occurring within the stands and project area (DeRose and Long 2014).

The proposed treatments are designed to address the contributing factors to stand-replacing wildfire. These treatments are designed to:

- Reduce surface and ladder fuel buildup
- Increase the height of live limbs or height to live crowns
- Reduce the density of tree stands, or the number of trees per acre
- Retain large and more fire-resistant trees

4.4.2. Treatments that Work

4.4.2.1. Efficacy of Treatments

In the past decade wildfire research has increasingly focused on the following:

- The most effective treatments for reducing the occurrence of stand-replacing wildfires
- The most efficient placement of treatments across the landscape for creating effective fuel breaks.

This research has shown that there are a variety of treatment activities that are effective at reducing the potential of large fire growth and stand-replacing wildfire although some treatments are more effective than others. Studies show more effective results when land managers mix commercial and non-commercial thinning treatments followed by prescribed burning treatments. "Silvicultural thinning and fire can be better integrated to work at larger scales needed for landscape resilience and reduce forest loss to type conversion" (North, et al. 2021).

Any of the vegetation treatments proposed in the project (thinning, commercial harvest, or prescribed burning) would be effective in addressing these conditions (Saavedra 2020).

The Forest Health Protection Report of 2020 for the Stormy project area states that a combination of mechanical and burn treatments should be considered to meet the project objectives. These treatments would result in increased growing space for residual trees and reduce inter-tree competition for limited resources (e.g., light, water, nutrients). See photo 7 for an example of an area that has undergone both mechanical treatment and prescribed fire.

Photo 7: Douglas-fir stand following mechanical harvest and prescribed fire

4.4.2.2. Prescribed Fire as a Treatment Tool

Reducing the large accumulation of dead and dying hazardous fuels with prescribed burning, especially those conditions resulting from recent epidemics of bark beetles, western spruce budworm, and endemic dwarf mistletoe, reduces the overall risk of stand-replacing wildfire in the project area.

Prescribed fire is proposed in treatment units in Alternatives 1 and 2 to holistically treat the landscape and to remove existing surface fuels as well as the slash buildup generated by other treatment activities. Reducing both surface and ladder fuels would create a forested system that reduces the potential for ground fire to reach tree canopies and become a crown fire. The proposed treatments would reduce tree crown connectivity and ladder fuels, which would increase canopy base height and open more growing space for the existing live overstory.

Prescribed fire thins tree stands, favors survival of larger fire-resistant trees, and increases mortality of small trees and trees with lower limbs. The main source of fuel for prescribed burning is ground fuels. Prescribed fire is [an] effective [tool] at surface fuel reduction (Van

Wagtendonk 1996), and it can also increase height to live crowns by scorching the lower crown of the stand (Miller and Urban 2000).

Prescribed fire can also improve growing conditions. Research indicates that rapid tree growth occurs when there is a rapid reduction and maintenance of low litter and duff surface fuels resulting from fall prescribed fire activities. This growth happens because there is an increase in water, nutrients (such as nitrogen and phosphorous), and solar heating. There is also improved water filtration, especially five years out from the fall prescribed fire treatment (Westlind and Kerns 2020).

Research shows that "prescribed burning appears to be the most effective treatment for reducing a fire's rate of spread, fire line intensity, flame length, and heat per unit of area. Not only are surface fuels reduced by this treatment, but understory and ladder fuels are also reduced to the point that spotting and crowning are not a serious threat" (Van Wagtendonk 1996)

How Prescribed Fire Promotes Future Timber Harvest Opportunities

The timing of prescribed fire operations can also have positive effects to existing timber stands. Because fire managers burn in specific seasonal windows of the year such as spring and fall and follow specific prescribed fire burn plans, they can manage the intensity and severity of fire, which limits mortality of larger live trees. As small trees are thinned by prescribed burning or thinning treatments, larger merchantable trees are retained and benefit from increased growth rates in the future.

The analysis for the Stormy Project and the Forest Vegetation Simulator (FVS) modelling supports this conclusion because it shows that tree size (measured by quadratic mean diameter) increases after treatment.

Planning and implementation of phased prescribed fire treatments can have benefits at both the project and landscape level and promote future timber harvest opportunities. These treatments allow land managers to strategically remove surface fuel and ladder fuel concentrations, increase height to live crowns, and in certain cases, reduce canopy bulk densities. "Prescribed fire at different levels from sub-stand to landscape level can help enhance, protect, or support a suitable timber base as well as general forest resiliency" (North, et al. 2021).

4.4.2.3. Mechanical Harvest and Thinning as a Treatment Tool

The best method in many instances is to treat forested landscapes with a pretreatment of commercial or noncommercial thinning and then with a prescribed fire ((Fule, et al. 2002, Fule, et al. 2002) (Weatherspoon, Fire-Silviculture Relationships in Sierra Forest 1996).

Mechanical treatments are an effective tool to manage dwarf mistletoe by selectively removing all obviously infected trees from affected stands. These treatments also simplify forest structure to a single story, which helps decrease wildfire's ability to spread. Reducing stand density and creating a mosaic of stand structures across the project area would also increase landscape resiliency against insects and disease (Saavedra 2020)

4.4.2.4. FVS Modelling Analysis Results

The Salmon-Challis used Forest Vegetation Simulator (FVS) to model stands out to the year 2081 using representative stand structures for three different cover types (Douglas-fir, lodgepole pine, and mixed conifer.) The primary input dataset used for the FVS modelling was forest inventory data from stand exams that were completed within the project area in 2020.

For each cover type, two groupings of proposed treatments were modelled in FVS:

- where multiple, successive treatments are proposed in the same area, for example commercial harvest followed by thinning and/or prescribed fire; and
- where broadcast burning is the only proposed treatment.

After inputting the treatments that would be most likely to occur over this timeframe, the results demonstrated that the number of trees per acre would decrease with the first treatment and would continue to decrease consistently until around 2041, at which point the desired number of trees per acre (as defined by the Forest Plan and desired conditions for stand resilience to insect and disease) would be achieved. In comparison, with no treatment the number of trees per acre would remain high above the desired amount throughout the same period of time. Figure 2 displays the effects on trees per acre (TPA) for Douglas-fir cover type from the FVS modelling. FVS returned similar results for lodgepole pine and mixed conifer cover types.

FVS results for areas where broadcast burning would be the only treatment show that canopy base heights would be projected to rise in each of the modelled cover types. By increasing the distance between the ground and the lowest live limbs, stands are better protected from stand-replacing wildfires because it is more difficult for a fire on the ground surface to transition to the crowns of the trees. Figure 3 displays the effect on canopy base heights for Douglas-fir cover type.

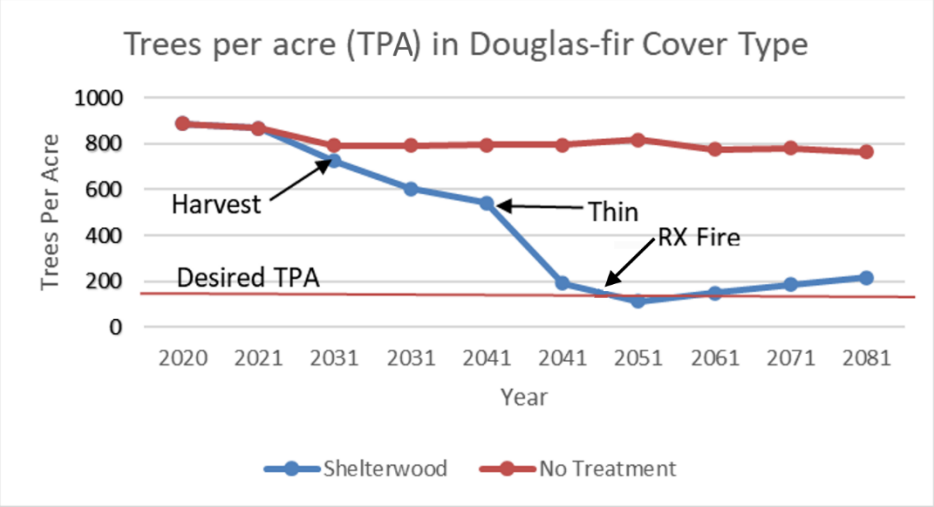


Figure 2: Effect on trees per acre (TPA) in Douglas-fir stands. Graphs for lodgepole pine and mixed conifer cover types show a similar pattern.

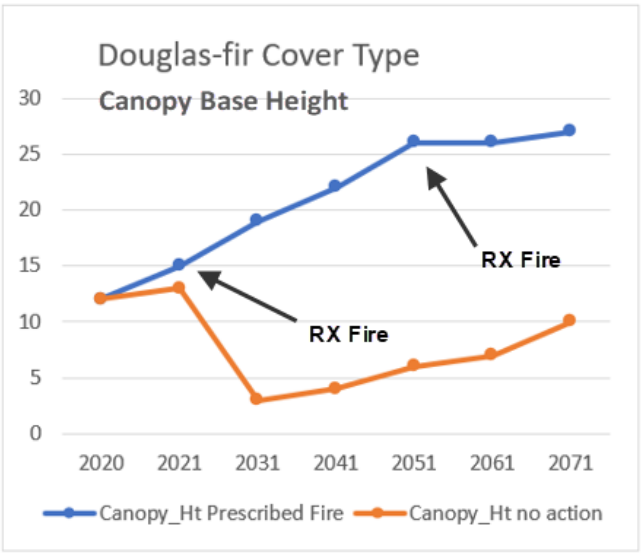


Figure 3: Effect on Canopy Base Height in Douglas-fir stands. Graphs for lodgepole pine and mixed conifer cover types show a similar pattern.

Douglas-fir

For Douglas-fir cover types, FVS modelling demonstrated that with the proposed treatments tree diameters[7] would begin to increase around 2041 and would continue to increase in size, remaining above what it would be if the stand were left untreated. In areas where broadcast

[7] Tree size is measured by quadratic mean diameter (qmd).

burning would be the only proposed treatment, canopy base heights steadily increase while they decrease without treatment.

Lodgepole Pine

FVS modelling demonstrated that the number of trees per acre in the representative lodgepole pine stand decreased with the first treatment and continued to decrease to reach the desired number of trees per acre by 2041. The model showed that without treatment the stand would have a much higher (yet slowly decreasing) number of trees per acre. When including proposed treatments, FVS modelling of tree size in lodgepole pine shows diameters increasing until 2051. Between 2051 and 2061 when the dynamics of how the species naturally regenerates take effect, tree size decreases. In areas where broadcast burning would be the only proposed treatment, canopy base heights increase while without this treatment, they generally remain the same throughout the projection period and are lower than the results for the proposed broadcast burning treatments.

Mixed Conifer

FVS modelling of the mixed conifer cover type generated similar results. The proposed treatments in mixed conifer cover type resulted in reducing the density of the tree stands and increasing the size of the remaining trees. In areas where broadcast burning would be the only proposed treatment, canopy base heights steadily increase while they slowly lower without this treatment.

4.4.3. Treatments in the Right Place

The key to effective fuels treatments is where they are placed on the landscape to help address hazardous fuels conditions that may contribute to stand-replacing wildfire. The scientific literature and FVS modelling indicate that the proposed treatments would effectively address these conditions.

The Salmon-Challis used the Next Generation Fire Severity Mapping dataset to evaluate the strategic placement of treatments within the project area for each alternative (see section 4.2). This dataset breaks down acres in the project area by the probability for stand-replacing wildfire to occur. Probability classes are broken down into very low, low, moderate, high, and very high. A summary of the results is in table 3.

Table 3: Number of acres treated under each probability class, as identified by Next Generation Fire Severity Mapping.

Probability Class	Alternative 1	Alternative 2	Alternative 3
Very Low	216	216	13
Low	4,306	4,323	1,414
Moderate	5,166	5,172	1,528
High	5,020	5,021	1,297
Very High	1,340	1,340	187

Maps 5 through 7 display the probability for stand-replacing wildfire by Next Generation Fire Severity Mapping classes for the project area. These maps also display the location of proposed treatments for each alternative.

Alternatives 1 and 2 would treat the largest number of acres at risk for stand-replacing wildfire. This holds true for all probability classes, from very low to very high. (See table 3.) Alternatives 1 and 2 would both treat 6,360 acres with a high or very high risk for stand-replacing wildfire, while Alternative 3 proposes to treat only 1,484 acres at that level.

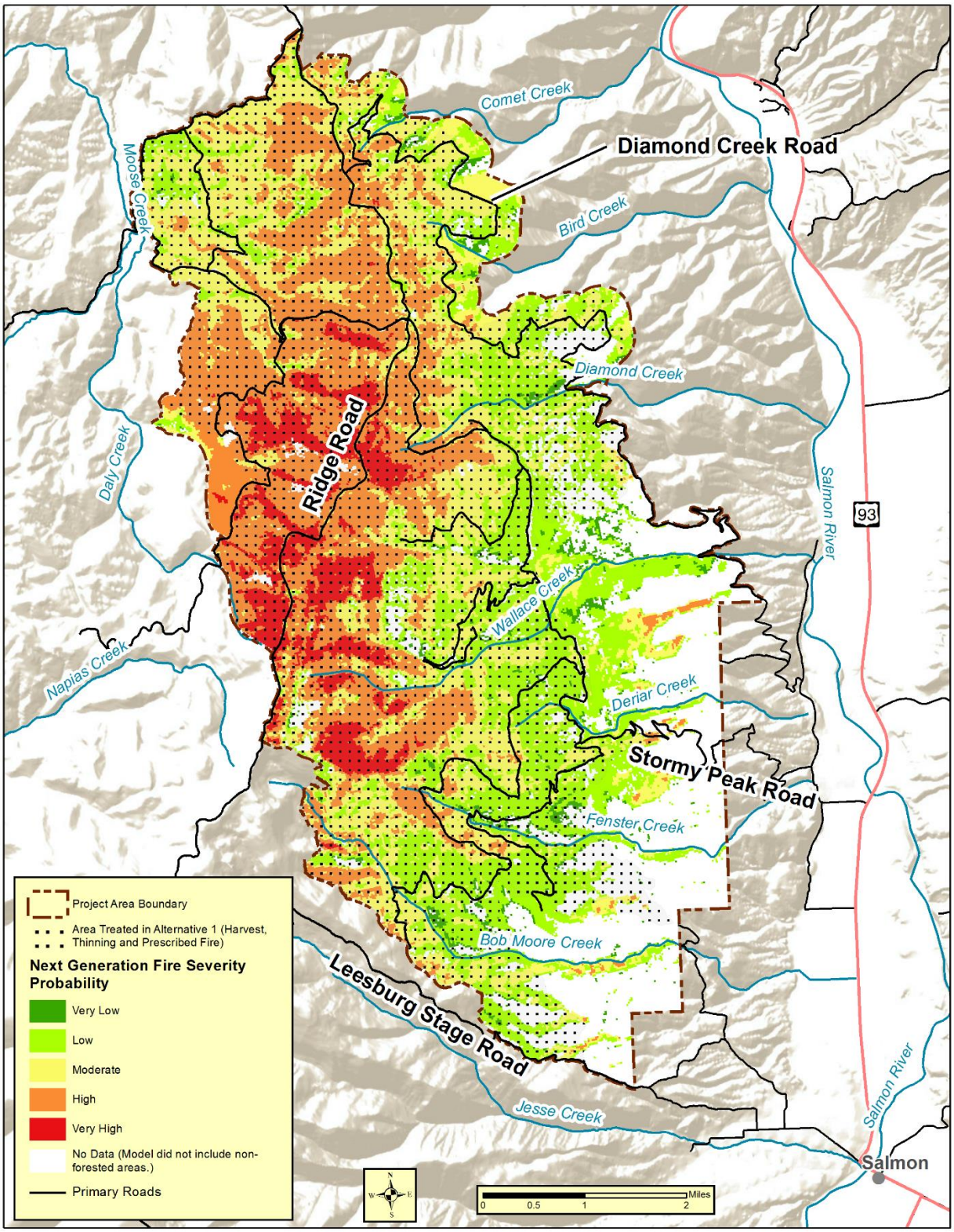
The strategic placement of mechanical harvest and prescribed fire treatments followed by ongoing routine maintenance would also help reduce the potential effects of future stand-replacing wildfires and would promote protection of identified values. By stitching together multiple timber harvest and fuels treatments at both the project and landscape scale, effective fuel breaks would be created, which would help protect the Salmon municipal watershed, important access roads, and private property. This would also promote firefighter and public safety.

The Stormy Project treatments would complement other projects that have been designed to help protect existing values, including the Salmon Municipal Watershed Project, Williams Farm Bill Project, and Phelan-Sharkey Project (see Map 8). All of these projects together are a landscape approach to protecting the City of Salmon's water supply while also promoting protection of private lands, helping to ensure safe ingress and egress (see photo 8 for example of a road after treatment), and protecting firefighter and public safety.

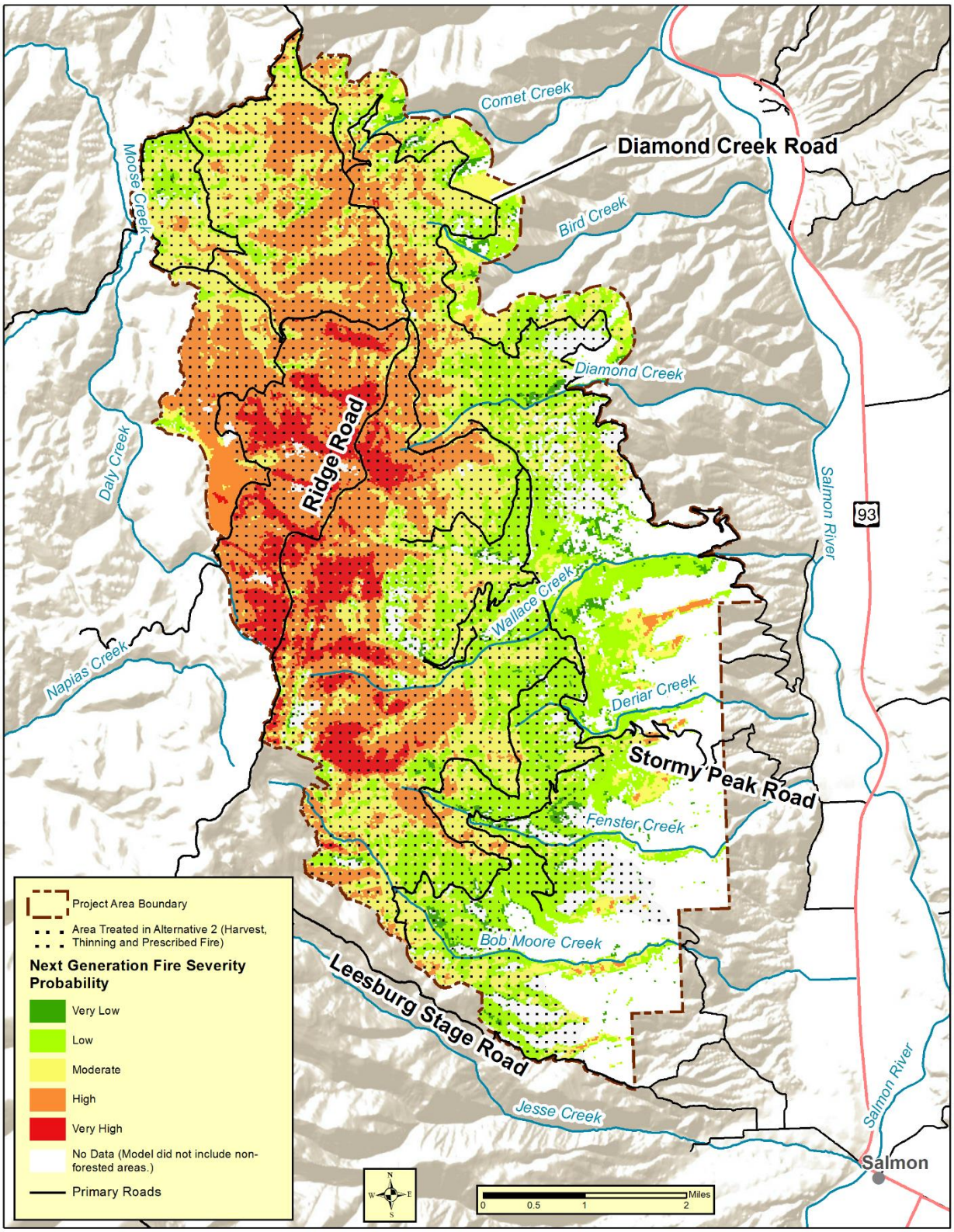
Photo 8: Prescribed fire operations in existing timber stands along main routes

4.4.3.1. Mud Lick Fire

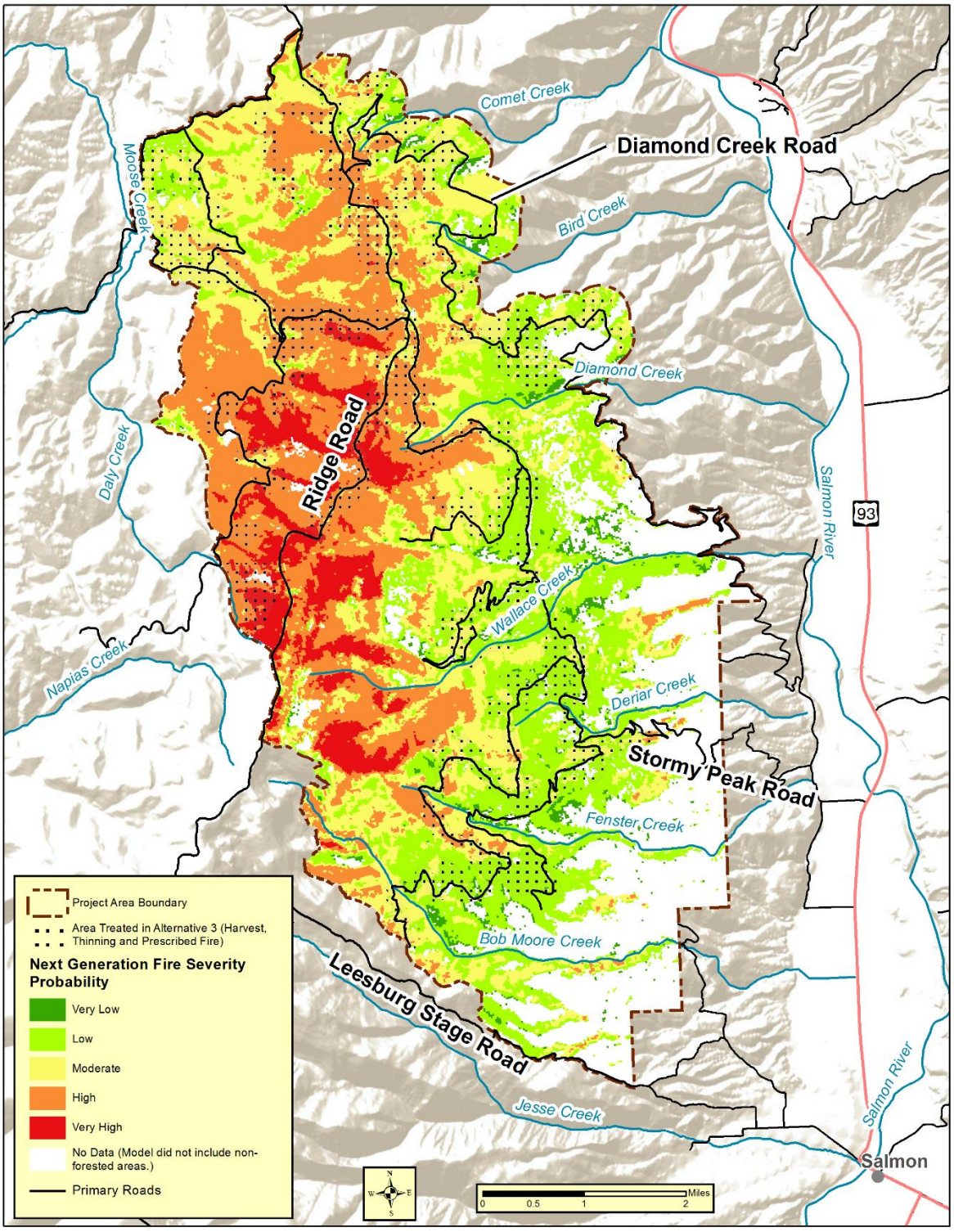
During the summer of 2021, firefighters constructed a contingency fire line adjacent to the Ridge Road (#60020) in response to the potential for the Mud Lick Fire to spread towards the City of Salmon and the municipal watershed. The fire line is approximately 150 feet wide and is cleared of all or most woody vegetation. This is part of the baseline condition of the affected area and supports the intent of strategic treatments across the landscape to protect identified values. The proposed Stormy Project treatments would increase the future utility of this line.



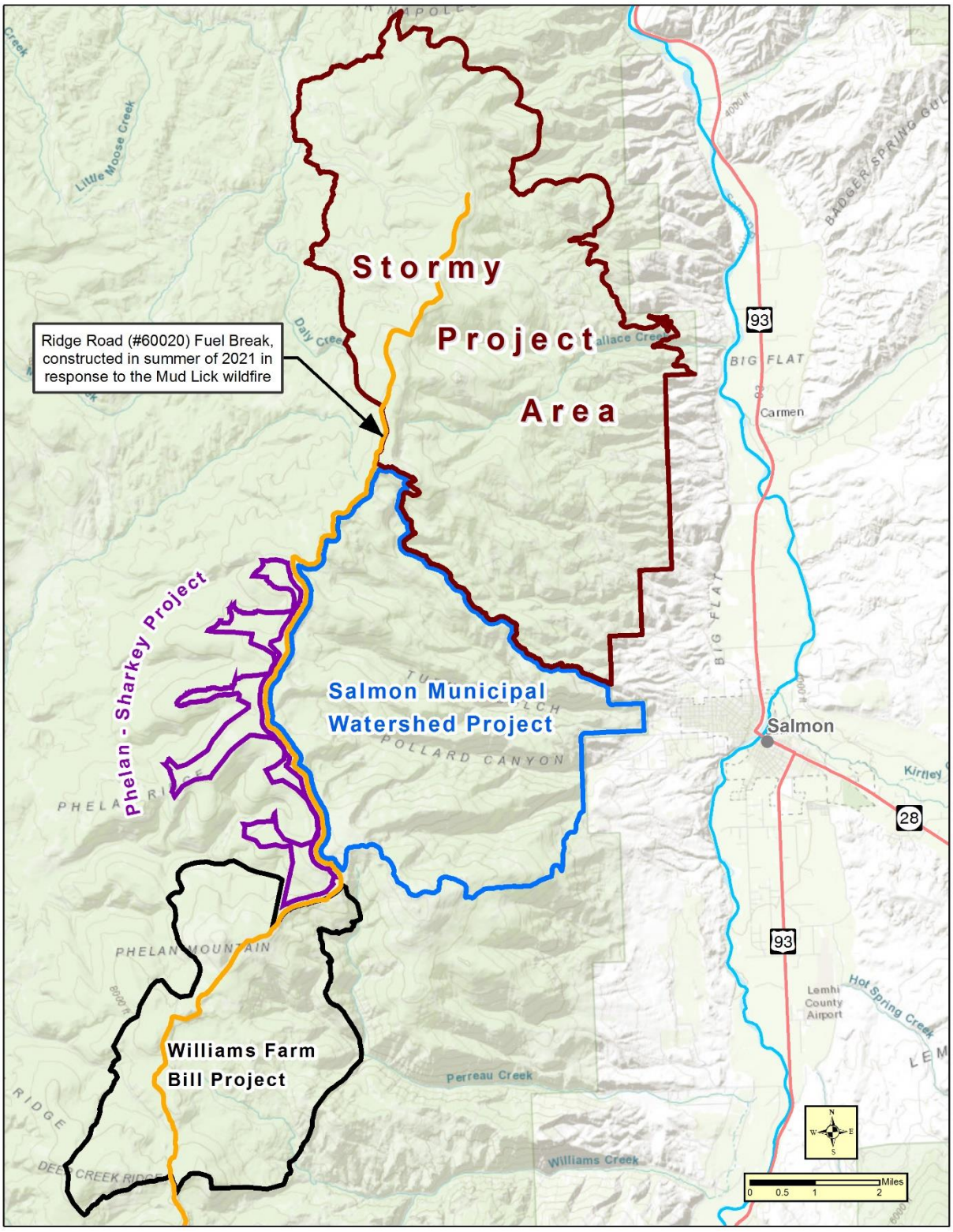
Map 5: Fire severity probability and Alternative 1 treatments



Map 6: Fire severity probability and Alternative 2 treatments



Map 7: Fire severity probability and Alternative 3 treatments



Map 8: Previous vegetation projects in the vicinity of the Salmon Municipal Watershed

4.5. Key Issue 2-- Which alternative would most reduce risk of potential undesired impacts from broadcast burning?

Prescribed burning implemented as a single treatment on the landscape can lack the precision of using a pretreatment of commercial or non-commercial tree thinning prior to burning (Weatherspoon 1996). Some of these negative effects may include secondary mortality of fire weakened trees to insects and disease or pockets of tree mortality.

Implementation of prescribed fire does come with risks and potential effects to other resources. This may be due to uncontrollable conditions such as unpredictable weather events. To guide prescribed fire implementation and to reduce risk to other resource values, fire managers develop specific prescribed fire burn plans. The Broadcast Burning description in Section 3.1.3.1 lists the factors that are considered in the burn plans. These plans ensure that prescribed fire objectives are met. The plans determine appropriate implementation timeframes and mitigate unintended consequences. A number of the Design Features for the Stormy project were specifically included to address potential effects to other resources.

Prescribed fire can produce pockets of mortality in which higher levels of tree mortality may occur. These pockets are more likely to occur in dense or insect-killed vegetation or areas that are influenced by slope and topography. These pockets of mortality are not inherently bad even if they become larger in size. The creation of these pockets of tree mortality helps to break up fuel continuity and connectivity that allows wildfire to pass from tree to tree. For this reason, breaking up fuel continuity reduces the potential for a stand-replacing wildfire. It is better that these pockets of tree mortality are created during prescribed fire operations when fire managers can better plan for and manage fire behavior.

Resource specialists compared the number of acres treated by broadcast burning by alternative as an indicator of potential negative effects of this activity. See table 4.

Table 4: Prescribed fire treatment acres by alternative

Treatment	Alternative 1 Acres	Alternative 2 Acres	Alternative 3 Acres
Broadcast Burning with Prior Harvest or Thinning	4,627 acres	5,755 acres	Not considered
Broadcast Burning Only	12,401 acres	11,273 acres	Not considered

Based on total acres treated by broadcast burning, Alternatives 1 and 2 have the highest potential for undesirable impacts from prescribed fire as they propose treating the most

acreage by broadcast burning. Alternative 3 has the least potential of undesirable impacts from prescribed fire, treating the fewest acres with broadcast burning. This comparison is solely based on acres treated with broadcast burning and is intended to transparently display the potential effects. It is important to understand and emphasize that this analysis and comparison is not an accurate reflection of the long-term benefits of broadcast burning to protecting identified values including timber resources, municipal watersheds, private land values, ingress and egress, and public and firefighter safety.

4.6. Summary of How Alternatives Affect the Key Issues

All proposed treatments work to reduce stand-replacing wildfires and to address other aspects of the project's purpose and need, but these treatments are more effective when they are combined with one another and stitched together to create a landscape-scale fuel break designed to protect values at risk and to develop safe and effective wildland fire response areas. These landscape-scale fuel breaks fragment the fuel continuity and connectivity required to start and sustain stand-replacing wildfires.

The proposed treatments work to meet the purpose and need and they help protect timber resources and communities on the landscape. The treatments also have some risk. However, when used under the right conditions and particularly when combined with other treatment activities, prescribed fire is a tool that produces targeted results while minimizing impacts to other resources.

4.6.1. Effects under Alternative 1

Alternative 1 prescriptively removes some of the trees, leaving a healthy stand with spacing appropriate for the species and habitat type. All treatment activities target the reduction of tree canopy bulk densities, surface and ladder fuels, and insect- and disease-infected trees while at the same time, they increase tree canopy base heights and break up the horizontal and vertical fuel connectivity of the current stand structures. These activities are intended to create canopy gaps that decrease the likelihood that a surface fire would transition into a crown fire. Prescribed burning would occur under conditions that promote low to mixed intensity burning to minimize soil heating and excessive tree mortality.

Under this alternative, fire managers would be able to manage wildfires to achieve land and resource management objectives as directed in the forest plan. Flame lengths and fire line intensities would be reduced, resulting in lower risk to firefighter personnel. The risk would come mostly from steep unmanageable terrain, untreated areas, or uncontrollable events. , Defensible corridors along egress and ingress routes would be at risk due to untreated gaps between treatment units.

4.6.2. Effects under Alternative 2

Alternative 2 has the same treatments as Alternative 1 but includes an additional 1,162 acres of timber harvest. Of these additional acres, 715 acres of harvest are located along major travel routes. They are design to create a consistent defensible corridor for firefighter and public safety. Alternative 2 has an additional 0.3 miles of temporary road construction.

Because of the additional acres of timber harvest in Alternative 2, the benefits described for Alternative 1 in section 4.6.1 would be increased under Alternative 2. These benefits include:

- Improved stand health with spacing appropriate for the species and habitat type
- Decreased tree canopy bulk densities, surface and ladder fuels, and insect- and disease-infected trees
- Increased canopy base heights
- Break-up of horizontal and vertical fuel connectivity
- Creation of conditions that promote low to mixed intensity prescribed burning and more effective management of future wildfires.

As described in section 4.4.2, the treatment sequence of commercial harvest and thinning treatments followed by prescribed burning is effective at reducing the potential of large fire growth and stand-replacing wildfire (North, et al. 2021). Compared to Alternatives 1 and 3, Alternative 2 would be more effective at reducing the potential of stand-replacing wildfire because it would combine the most acres of harvest and thinning treatments followed by prescribed burning.

Under this alternative, all treatments are stitched together along ingress and egress routes, leaving fewer untreated gaps between treatment units. This placement of treatments would allow fire personnel opportunities to implement prescribed fire treatments that would combine the Stormy project area with other project areas into one holistic fuel break that would span a large landscape aimed at protecting the community of Salmon, the Salmon Municipal Watershed, and life and property.

Compared to Alternatives 1 and 3, Alternative 2 would more effectively create a defensible corridor and increase public safety because of the treatment units' placement along major travel routes.

4.6.3. Effects under Alternative 3

Alternative 3 would have the same number of harvest treatment acres as Alternative 2. Alternative 3 would not include any thinning treatments or any prescribed fire treatments that

are outside of a harvest unit. Under Alternative 3, treatments would be widely spaced throughout the project area. This means that on a landscape scale, surface fuels, ladder fuels, and canopy bulk density would continue to accumulate, and canopy base heights would continue to decrease.

"(I)f fuel treatments are small and scattered, or a long time has elapsed since treatment (generally 10-15 years or more), they will be less effective in fragmenting the landscape fuel loads, and their efficacy at the stand level can be overwhelmed by intense fires burning in adjacent areas" (Agee & Skinner, 2005).

4.6.4. Comparison of Effects for Alternatives

Alternatives 1 and 2 have more potential than Alternative 3 for undesirable impacts from prescribed fire, but they also provide the greatest potential benefit of protecting commercial products, community infrastructure, limiting stand conversion, reducing the impacts of a stand-replacing wildfire, and creating safe and effective wildfire response areas.

Alternative 3 has the least potential for undesirable impacts from prescribed fire. It treats the fewest acres, provides the least potential for protecting commercial products and community infrastructure. It has the least potential for reducing the impacts of a stand-replacing wildfire and creating safe and effective wildfire response areas. This is evident in the summary of effects in table 5. Compared to Alternatives 1 and 2, Alternative 3 achieves only a few of the goals for this project.

This leads to the conclusion that overall, Alternative 2 has the most effective treatment plan for meeting the project's purpose and need. This is because, compared to Alternatives 1 and 3, Alternative 2 would:

- Treat the most acres through harvest and thinning
- Treat the most total acres through broadcast burning
- Treat the most acres through broadcast burning within harvest and thinning units
- Most effectively create a defensible corridor for firefighter and public safety

Table 5: Summary of effects

Effect	Alternative 1	Alternative 2	Alternative 3
Reduces and manages surface and ladder fuels on a landscape scale	Yes	Yes	No

Effect	Alternative 1	Alternative 2	Alternative 3
Reduces canopy densities or trees per acre on a landscape scale	Yes	Yes	No
Increases the height of live limbs on a landscape scale	Yes	Yes	No
Reduces the potential for stand-replacing high-severity wildfires on a landscape scale	Yes	Yes	No
Reduces the risk to values on a landscape scale	Yes	Yes	No
Protects and enhances timber products on a landscape scale	Yes	Yes	No
Improves ingress or egress routes within the area and to private property	Yes	Yes	Yes
Creates safe and effective wildfire response areas thereby protecting life and property on a landscape scale	Yes	Yes	No
Creates a network of fuel breaks on a landscape scale	Yes	Yes	No
Establishes a fuel break width of at least a ¼ mile wide	Yes	Yes	No
Provides land managers with options to maintain historical conditions on a landscape scale	Yes	Yes	No
Establishes conditions that are favorable for future wildfire management strategies and prescribed fire maintenance burning on a landscape scale	Yes	Yes	No

Effect	Alternative 1	Alternative 2	Alternative 3
Increases resilience to a variety of forest insect and disease agents on a landscape scale	Yes	Yes	No
Reduces the large accumulation of dead and dying hazardous fuels, especially those associated with recent epidemics of bark beetles, western spruce budworm, and endemic dwarf mistletoe on a landscape scale	Yes	Yes	No
Provides a mix of forest products to local and regional purchasers through personal-use and commercial permits and timber sale contracts	Yes	Yes	Yes
Treats fuels adjacent to the Jesse Creek drainage to reduce the potential negative impacts of a large wildfire in the Salmon Municipal Watershed	Yes	Yes	No

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6. Appendix A –List of Abbreviations and Glossary

6.1. Abbreviations and Acronyms

BMP	Best management practices
EA	Environmental Assessment
ESA	Endangered Species Act
FSH	Forest Service Handbook
FVS	Forest vegetation simulator
GIS	Geographic information systems
IDT	Interdisciplinary team
MIIH	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing
NE	No effect
NI	No impact
PSD	Plastic sphere dispenser
RHCA	Riparian habitat conservation area
TE	Threatened and Endangered species (under the Endangered Species Act
USDA	United States Department of Agriculture

6.3. Glossary

Definitions for these terms come from the *Salmon-Challis Land and Resource Management Plan* (Forest Plan), the Southern Research Station *Glossary of Forest Engineering Terms,* and the National Wildfire Coordinating Group's Glossary unless otherwise noted.

A-E

Airshed: A geographic area that, because of topography, meteorology, and climate, shares the same air. As applied to the National Forest by the Clean Air Act, amended August 1977, the term covers all wilderness areas larger than 5000 acres that were in existence as of August 1977.

Allotment: A designated area of land available for permitted livestock grazing (36 CFR 222)

Best management practices for water quality: Methods, measures, or practices selected by an agency to meet its nonpoint source control needs. Best management practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Best management practices can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters. (36 Code of Federal Regulations 219.19).

Clearcut: 1) Cutting all trees in an area to a minimum diameter 2) all merchantable trees are cut and removed.

Commercial thinning: Partial harvesting of a stand of trees for economic gains from the harvested trees and to accelerate the growth of the trees left standing.

Commercial timber harvest: See "Timber harvest."

Cover type: The existing vegetation of an area described by the dominant plant species.
Crown Fire: A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.

Developed recreation site: Relatively small, distinctly defined area where facilities are provided for concentrated public use, e.g., campgrounds, picnic areas, swimming areas.

Diameter breast height: The diameter of a tree measured 4.5 feet above the ground on the uphill side of the tree, or diameter of a log measured 4.5-feet from the large end of the log ("How to Measure a Big Tree" by USFS 2005).

Endangered species: Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plants or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.

Environmental document: A written analysis that provides sufficient information for a responsible official to undertake an environmental review. Examples include: a categorical

exclusion, an environmental assessment, and an environmental impact statement (36 Code of Federal Regulations 219.19).

F-K

Fire severity: Degree to which a site has been altered or disrupted by fire; loosely, a product of fire intensity and residence time.

Flame length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Floodplain: The lowland and relatively flat area adjoining inland waters, including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

Forest Plan or land management plan: A document or set of documents that provide management direction for an administrative unit of the National Forest System developed under the requirements of the 2012 Planning Rule or a prior planning rule. (36 Code of Federal Regulations 219.19).

Fuel Loading: The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total fuel and is usually dry weight.

Ground fuels: All combustible materials below the surface litter, including duff, tree or shrub roots, punky wood, peat, and sawdust, that normally support a glowing combustion without flame.

Harvest: Removing merchantable trees--compare with cuttings, which remove immature trees).

Individual tree selection (single tree selection): A method where individual trees of all size classes are removed throughout the stand, to promote growth of remaining trees and to provide space for regeneration.

Interdisciplinary Team: Section 102(2)(A) of the National Environmental Policy Act requires all agencies to use an interdisciplinary approach to analysis which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and decision making which may have an impact on the human environment (42 U.S.C. 4332(2)(A)).

Intermediate cut: A harvest method designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest. (Forest Service Reforestation Glossary)

L-Q

Ladder fuels: Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

Landscape: A defined area irrespective of ownership or other artificial boundaries, such as a spatial mosaic of terrestrial and aquatic ecosystems, landforms, and plant communities,

repeated in similar form throughout such a defined area. (36 Code of Federal Regulations 219.19).

Lop and scatter: To cut limbs from standing trees and scatter the cut material around the immediate area.

Maintain: In reference to an ecological condition: To keep in existence or continuance of the desired ecological condition in terms of its desired composition, structure, and processes. Depending upon the circumstance, ecological conditions may be maintained by active or passive management or both. (36 Code of Federal Regulations 219.19).

Management area: A land area identified within the planning area that has the same set of applicable plan components. A management area does not have to be spatially contiguous. (36 Code of Federal Regulations 219.19).

Mosaic: 1) Areas with trees and areas without trees occurring in interrupted sequence, 2) •The intermingling of plant communities and their successional stages in such a manner as to give the impression of an interwoven design.

Native species: An organism that was historically or is present in a particular ecosystem as a result of natural migratory or evolutionary processes, and not as a result of an accidental or deliberate introduction into that eco- system. An organism's presence and evolution (adaptation) in an area are determined by climate, soil, and other biotic and abiotic factors. (36 Code of Federal Regulations 219.62).

Piles: Picking up tree-length logs or bolts and depositing them in large piles so that the logs are horizontal and parallel to each other and the ends are approximately in the same vertical planes.

Plantation: Forest stand regenerated artificially either by sowing or planting.

Plastic sphere dispenser (PSD): Device installed (but able to be jettisoned) in a helicopter, which injects glycol into a plastic sphere containing potassium permanganate, which is then expelled from the machine and aircraft. This produces an exothermic reaction resulting in ignition of fuels on the ground for prescribed or wildland fire applications.

Prescribed Fire: A wildland fire originating from a planned ignition in accordance with applicable laws, policies, and regulations to meet specific objectives (2009 Guidance for Implementation Federal Wildland Fire Management Policy and Fire Management Board Memorandum 19-004a).

Project: An organized effort to achieve an outcome on National Forest System lands identified by location, tasks, outputs, effects, times, and responsibilities for execution. (36 Code of Federal Regulations 219.19).

R-S

Responsible official: The Forest Service employee who has been delegated the authority to carry out a specific planning action.

Resilience: At a general level used to refer to the ability of a system (ecological or human) to resist damage and recover from a disturbance. In ecology, resiliency tends to refer to the ability of the system to return to the pre disturbance state with no assessment of whether that state is desirable or not. From a social perspective, resilience may reference ability to return to the original state but also can refer to the ability to recover to a state more likely to resist or recover quickly from future disturbance.

Riparian: Land areas which are directly influenced by water. They usually have visible vegetative or physical characteristics showing this water influence. The areas directly adjacent to creeks, rivers, lake borders, or marshes are typical riparian areas.

Scarification: Shallow loosening of the soil surface.

Scoping: Scoping includes refining the proposed action, determining the responsible official and lead and cooperating agencies, identifying preliminary issues, and identifying interested and affected persons.

Seed tree cut: Removal in one cut of the mature timber crop from an area, except for a small number of seed bearers left singly or in small groups.

Shelterwood: Mature trees left standing to provide shelter in which saplings can grow.

Shelterwood establishment cut: A cut to help establish a healthy environment for the specific area treated, prepare the seed bed, and create a new age class.

Shelterwood removal cut: A final cut that reduces competition for new trees. In this phase, shelter trees are cut when they are no longer needed to protect the new trees.

Silviculture: A branch of forestry dealing with the development and care of forests (Merriam-Webster Dictionary).

Skidding: Transporting trees or parts of trees by trailing or dragging them.

Slash: The residue left on the ground after timber cutting and/or accumulating there as a result of storm, fire, or other damage. It includes unused logs, uprooted stumps, broken or uprooted stems, branches, twigs, leaves, bark, and chips.

T-Z

Thinning: See **Timber stand improvement thinning**.

Threatened species Those plant or animal species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future.

Timber harvest: The removal of trees for wood fiber use and other multiple-use purposes.

Timber stand improvement thinning: Measures such as thinning, pruning, release cutting, prescribed fire, girdling, weeding, or poisoning of unwanted trees aimed at improving growing condition of the remaining trees. This treatment is referred to as “thinning” in this document.

Watershed: A region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water.

Whole-tree yarding: See “Yarding.”

Yarding Initial hauling of a log from the stump to a collection point.